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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,902	03/31/2004	Hemal V. Shah	P19014	9300

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EXAMINER	
MISIURA, BRIAN THOMAS	
ART UNIT	PAPER NUMBER
2112	

DATE MAILED: 05/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/815,902	SHAH ET AL.	
	Examiner	Art Unit	
	Brian T. Misiura	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,14-19 and 27-32* is/are rejected.

7)☒ Claim(s) *7-13,20-26 and 33-39* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/3/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Response to Amendment

Applicant's arguments with respect to claims 1-39 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

Claims are objected to because of the following informalities:

Regarding claims 2, 15, and 28: "...when the state of the event data structure is one of armed and unarmed and where interrupts..". The state of the event data structure cannot simultaneously be one of both "armed and disarmed". The examiner suggests amending the claim to read: "is one of armed *or* unarmed".

Regarding claims 14 and 19: The examiner believes the word "in" contained within the preamble of these claims should not be there. The examiner suggests removing the word "in" so that the preamble reads: "A system for interrupt process, comprising:"

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 14-19, 27-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Kagan et al. U.S. Patent Application Publication No. 2003/0065856.

Per claim 1, Kagan discloses: a method for interrupt processing, comprising:

- determining that an event has occurred (paragraph **73**, figures 3-5, "The method of FIG 5 begins when HCA 22 writes a CQE to one of completion queues 46 at step 60." – This signifies an event has occurred.);
- determining a state of an event data structure (the 'event data structure' of Kagan comprises the combination of the completion queues **46** and event queues **48** or either referred to individually – paragraph **54**) (paragraph **73**, figures 3-5, "When the completion queue is in armed state **92 (FIG.4)**," – this signifies that the state of the completion/event queues are taken into account prior to determining what to do with the event that has occurred. See figure 4 and paragraphs 67-71 for more explanation regarding the state diagram.),
- wherein the even data structure includes one or more entries (paragraph 63, particularly: "Event queues 48 may contain event entries of various different types generated by HCA 22."),
- and wherein each of the entries is capable of storing event specific parameters (paragraph **63**, figure 3, specifically 'For completion events, the even entry in queue **48** preferably indicates the completion queue number (CQN) of completion queue **46** reporting the event')
- and an event code field that identifies at least one of an event source and function of an Input/Output (I/O) device (paragraph **63**, figure 3, specifically: "Event queues 48

may contain event entries of various different types generated by HCA 22. Each entry contains sufficient information so that the event handler software can identify the source and type of the event."); and

- writing an event entry into the event data structure in response to determining that the event has occurred and based on the state of the event data structure (paragraph 73, figures 3-5, particularly: "when HCA **22** writes a CQE(described in paragraph **10**) to one of the completion queues...When the completion queue is in armed state **92 (FIG. 4),** the existence of the CQE causes HCA 22 to write an event entry to the event queue 48 to which this completion queue is mapped, at an even generation step 100).

Per claims 2, 15, and 28, Kagan discloses: the method of claim 1, further comprising:

- issuing an interrupt in response to determining that the state of the event data structure is armed and that a condition exists to cause an interrupt (paragraph **71**, figure 4, particularly: "When a given event queue is moved to armed state 92 by the host software, the HCA checks whether the consumer index (read pointer) for the given event queue is equal to the producer index (write pointer) before generating new event entries. If the consumer index for the queue is not equal to the producer index, the HCA generates the corresponding interrupt immediately."),
- wherein events are posted to the event data structure when the state of the event data structure is one of armed *or* unarmed (paragraph 67, "Initially, any given completion queue **46** is in a disarmed state **90**, meaning that addition of CQEs (described in paragraph **10**) to the completion queue will not cause HCA **22** to generate events.) and (paragraph 68, "While the completion queue is in armed state 92, existence of a CQE in the queue will cause the HCA to write an event entry to the appropriate event queue 48.")
- and wherein interrupts are not issued when the state of the event data structure is unarmed (paragraph 69, figures 3 and 4, particularly: "a given event queue will assert its corresponding interrupt only when the event queue is in armed state."

Also, paragraph 71, particularly: "A new interrupt will be generated if the queue is armed, and the consumer index is not equal to the producer index. Thus, if the HCA adds more events to the queue after the host process has finished with even consumption, but prior to arming the event queue (unarmed state), the interrupt will be asserted immediately upon arming of the event queue.").

Per claims 3, 16, and 29, Kagan discloses: the method of claim 1, further comprising: shutting down in response to determining that the state of the event data structure is undefined.

Per claims 4, 17, and 30, Kagan discloses: the method of claim 1, further comprising: checking a structure state indicator to determine the state of the event data structure.

Per claims 5, 18, and 31, Kagan discloses: the method of claim 1, further comprising:

- advancing a write indicator in the event data structure (paragraph 65, "The producer index is updated by the HCA as it writes entries to the event queue,");
- checking for an overflow condition (paragraph 65, "Before writing a new entry to the event queue, the HCA checks the values of the consumer and producer indices to make sure that the event queue is ready to accept the entry.");
- and processing the overflow condition in response to determining that an overflow condition exists (paragraph 65, "EQ context **54** also indicates another event queue to which the HCA can report errors in the event queue, such as buffer overflow.").

Per claims 14 and 27, Kagan discloses: a system for in interrupt processing, comprising:

- an Input/Output device coupled to a bus (paragraph 50, figure 1, "Host 24 and HCA 22 are connected by a suitable system controller to a system memory 32 via a bus 28," – HCA represents the I/O Device of this limitation);

- and circuitry at the Input/Output device (refer to figure 1, components of HCA 22 represent circuitry of this limitation) operable to:
- determining that an event has occurred (paragraph **73**, figures 3-5, "The method of FIG 5 begins when HCA 22 writes a CQE to one of completion queues 46 at step 60." – This signifies an event has occurred.);
- determining a state of an event data structure (the 'event data structure' of Kagan comprises the combination of the completion queues **46** and event queues **48** or either referred to individually – paragraph **54**) (paragraph **73**, figures 3-5, "When the completion queue is in armed state **92 (FIG.4)**," – this signifies that the state of the completion/event queues are taken into account prior to determining what to do with the event that has occurred. See figure 4 and paragraphs 67-71 for more explanation regarding the state diagram.),
- wherein the even data structure includes one or more entries (paragraph 63, particularly: "Event queues 48 may contain event entries of various different types generated by HCA 22."),
- and wherein each of the entries is capable of storing event specific parameters (paragraph **63**, figure 3, specifically 'For completion events, the even entry in queue **48** preferably indicates the completion queue number (CQN) of completion queue **46** reporting the event')
- and an event code field that identifies at least one of an event source and function of an Input/Output (I/O) device (paragraph **63**, figure 3, specifically: "Event queues 48 may contain event entries of various different types generated by HCA 22. Each entry contains sufficient information so that the event handler software can identify the source and type of the event."); and
- writing an event entry into the event data structure in response to determining that the event has occurred and based on the state of the event data structure (paragraph 73, figures 3-5, particularly: "when HCA **22** writes a CQE(described in paragraph **10**) to one of the completion queues...When the completion queue is in armed state **92 (FIG. 4),** the existence of the CQE causes HCA 22 to write an event

entry to the event queue 48 to which this completion queue is mapped, at an even generation step 100).

Per claim 6, Kagan discloses: a method for interrupt processing, comprising:

- determining that an interrupt has occurred (paragraph **73**, figures 3-5, "The method of FIG 5 begins when HCA 22 writes a CQE to one of completion queues 46 at step 60." – This signifies an event/interrupt has occurred.);
- reading an event entry in an event data structure in response to determining that the interrupt has occurred (paragraph 73, "When the completion queue is in armed state, the existence of the CQE causes HCA 22 to write an event entry to the event queue 48 to which this completion queue is mapped,"),
- wherein the even data structure includes one or more entries (paragraph 63, particularly: "Event queues 48 may contain event entries of various different types generated by HCA 22."),
- and wherein each of the entries is capable of storing event specific parameters (paragraph **63**, figure 3, specifically 'For completion events, the even entry in queue **48** preferably indicates the completion queue number (CQN) of completion queue **46** reporting the event')
- and an event code field that identifies at least one of an event source and function of an Input/Output (I/O) device (paragraph **63**, figure 3, specifically: "Event queues 48 may contain event entries of various different types generated by HCA 22. Each entry contains sufficient information so that the event handler software can identify the source and type of the event."); and
- and updating a state of a structure state indicator to unarmed to indicate that interrupts are not allowed (figure 4, the arrows from bubbles 92 and 94 to bubble 90 indicates the transition to the disarmed state. As has been mentioned in paragraph 69, "a given event queue will assert its corresponding interrupt only when the event queue is in armed state 92." Therefore when in the disarmed state, no interrupts will be allowed.).

Per claims 19 and 32, Kagan discloses: a system for interrupt processing, comprising:

- an Input/Output device driver coupled to a bus (According to the applicants' specification, the device driver is located in Memory 106 of figure 1 along with an event data structure 126. Kagan discloses a memory containing event data structures in completion and event queues 46 and 48 which is communication with the HCA in the same was as the applicants HBA is in communication with the device driver 120);
- and circuitry at the Input/Output device driver operable to (circuitry consists of components illustratively contained within system memory 32, figure 1):
- determining that an interrupt has occurred (paragraph **73**, figures 3-5, "The method of FIG 5 begins when HCA 22 writes a CQE to one of completion queues 46 at step 60." – This signifies an event/interrupt has occurred.);
- reading an event entry in an event data structure in response to determining that the interrupt has occurred (paragraph 73, "When the completion queue is in armed state, the existence of the CQE causes HCA 22 to write an event entry to the event queue 48 to which this completion queue is mapped,"),
- wherein the even data structure includes one or more entries (paragraph 63, particularly: "Event queues 48 may contain event entries of various different types generated by HCA 22."),
- and wherein each of the entries is capable of storing event specific parameters (paragraph **63**, figure 3, specifically 'For completion events, the even entry in queue **48** preferably indicates the completion queue number (CQN) of completion queue **46** reporting the event')
- and an event code field that identifies at least one of an event source and function of an Input/Output (I/O) device (paragraph **63**, figure 3, specifically: "Event queues 48 may contain event entries of various different types generated by HCA 22. Each entry contains sufficient information so that the event handler software can identify the source and type of the event."); and

- and updating a state of a structure state indicator to unarmed to indicate that interrupts are not allowed (figure 4, the arrows from bubbles 92 and 94 to bubble 90 indicates the transition to the disarmed state. As has been mentioned in paragraph 69, "a given event queue will assert its corresponding interrupt only when the event queue is in armed state 92." Therefore when in the disarmed state, no interrupts will be allowed.).

Allowable Subject Matter

Claims 7-13, 20-25, and 33-39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian T. Misiura whose telephone number is (571) 272-0889. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rehana Perveen can be reached on (571)272-3676. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Brian Misiura
5/16/2006

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SUPERVISORY PATENT EXAMINER
5/22/06